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CENTRAL INTELLIGENCE AGENCY

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SUBJECT Development of a Small Musa Installation by Funkwerk Koepenick

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"For the further extension of our radio lines it is not only necessary to have a multiple-type antenna installation for long-distance radio traffic, - as for instance with China - but also Musa installations, which are needed for other services, including the naval radio service for fishery radio. We would like to replace the multiple-type diversity installations as used abroad by a small Musa installation with two antennae."

Department TEE of Funkwerk Koepenick started the development in the latter part of 1952 under the supervision of Guenther Hintze. The following are the specifications of the research project contained in the research application for 1953:

Theme: K3-38: Twin-type sweep antenna receiver installation for commercial radio as a substitute for the diversity procedure, without single side-band addition. Frequency range: 4 to 22 MHz.

Key word: Twin-type sweep antenna receiver installation for 4 - 22 MHz (Klein Musa).

Technical characteristics: A twin-type receiver with a sweep arrangement is to be developed for the antenna installation existing in Beelitz. The project includes construction of the pre-stages, oscillator, mixer stages, intermediary frequency part, phase shift installation and its accessories, indication amplifier, power supply, and antennae with accessories. Technical conditions are to be

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worked out in cooperation with the Ministry for Post and Telecommunications.

Coordination: With the Ministry for Post and Telecommunications.

Funds amounting to 240,000 DME were made available for the project. Of this amount, 38,000 DME were spent in 1952. For 1953, 100,000 DME were approved. The project includes the construction of a model. The completion date was set for the end of 1954. In the scientific-technical motivation for the 1953 extension of the project, signed by Wilhelm Grimm, it is specified that

> "the reception procedure now in common use (diversity) has some shortcomings for commercial services and for ball reception which can be partly overcome by a twin-type sweep installation. Funkwerk Koepenick was informed in a preparatory conference with the Ministry for Post and Telecommunications that such installations are planned for a great part of the long-distance traffic."

2. Progress of the development project during the first eight months of 1953 is outlined by the following extracts from monthly progress reports on the installation:

a. January 1953: Concerning the twin Musa project, the existing laboratory sample was set up and put into trial operation. The phase shift installation for adding together the two channels and the low-frequency parts has already been joined. The indication valve, which is now under construction, will make it possible to find the way in which the phase variations occur on the two channels and to set correctly the summation voltage. One of the AEST receivers delivered to us is now being rebuilt. The receivers cannot be used in the condition in which they arrived. They have self-excitation and a low-frequency band width which is much too small to permit radio Musa reception. Our hopes that we should be able to join together two devices provisorily and on a laboratory scale by late 1952 were shattered because of the bad condition of the receivers. Tentatively, we promised the Soviet Control Officer of the Beelitz Radio Office that this operation can be carried out in late February, provided that no serious difficulties arise. We shall probably not be able to meet this deadline. The measurements in Beelitz were provisorily carried out with a rhombus. The symmetry transformers were measured here in the laboratory. They are in order. Since the "Grosstationsempfaenger" project has been cancelled, there are no high-quality receivers for the small Musa installation. If the project is not approved again later, an amendment to the small Musa project will have to be made for the necessary receivers. Possibly, a new commercial short-wave instrument in "table construction" (Tischbauweise) must be developed for this purpose. Information from HV Funk should be obtained as to whether the Musa project is to be extended so as to include development of a medium commercial short-wave receiver or whether a separate order will be issued for a medium or large receiver, which either partly or totally will be included in the triple-Musa project. There is also the possibility of developing a special Musa receiver with two channels and of doing without the development of a small and large receiver. Here, too, difficulties arise because HV Funk has not appointed a responsible official in charge of the project. Provisorily, the following decision is made:

Designing is to be started immediately: a sketch of a rack for the twin-Musa installation on a laboratory scale is to be made. The following devices are to be combined in one rack: two AOST receivers; one field with Braun tube; one low-frequency field, and the two network sets. This set will not yet permit exact measurement of the incidence angle for long-distance reception from the Soviet Union and from eastern countries, but will nevertheless be an improvement over radio reception. It is estimated that through direct cooperation with the workshop the set can be completed by early March. The wiring will be performed in the laboratory workshop of Department TF. The1952 goal,which was to connect together two channels with a goniometer on a laboratory scale, has been reached.

b. February 1953: Rack: According to Colleague Krueger of TK, construction is completed. The delivery deadline is the middle of the month, or 18 February at the latest. The construction is not supposed to be in the completely finished form. The device is to be built as an experimental device. Surface treatment is not required.
AOST receiver: The two receivers delivered to us have been converted into receivers with the required larger band width. The two receivers will soon be connected with one joint oscillator so that the receivers, too, can be completed by the date requested. It should be pointed out, however, that the receivers, even after conversion, will not be able to meet the standards of commercial devices. Their inside construction is so primitive that phase distortions and other mistakes are unavoidable. The low-frequency part has been tested in the laboratory and has been released for being built into the set.
Sweep and indicator part: The necessary parts, including two goniometers, have been procured.

c. March 1953: The rack will arrive on 15 March. Receiver conversion has progressed to the point that balancing can begin. After the middle of the month work on assembling the rack can begin. The first tests with two antennae can begin by the end of the month. The antennae will be provisorily set up.

d. April 1953: The sweep part could not be entirely completed because the high-frequency construction elements were too different. It will, however, be completed shortly. The rack has not been delivered as yet. Colleague Titze has promised early delivery. Low-frequency transformers have not been delivered by TKO either. They are expected to arrive within the next few days. We should be able to transfer the completed installation to Beelitz on 21 April. There are, however, strong doubts about it because the above mentioned parts are still missing.

e. July 1953: The trial tests in Beelitz with the provisory twin-Musa installation which was built from old, hardly usable, converted receivers have resulted in a non-essential improvement of reception possibilities. A report to this effect has been forwarded to Colleague Paulik of HV Funk. Further work on the Musa installation bears on the development of an antenna amplifier for the Beelitz rhombus antenna. This development is almost completed by now. A test model is under construction. We hope therewith to be able to eliminate the mistakes caused by faulty aerial feeder installations in Beelitz. It is expected that the antenna amplifier will be completed by mid-July. TE and TFA will test the antenna amplifier in Beelitz and make suggestions to Beelitz with respect to aerial wiring. Furthermore, the automatic sweeping of the aerial characteristics is under work. The connection scheme will be completed by 12 July. Construction and test cannot be completed before late August. When Beelitz is visited for the testing of the antenna amplifier, we will find out when the Twin-Musa rack can be brought back.

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f. 30 August 1955: Colleague Pavlik of HV Funk has not been able as yet to find out in which direction and approximate distance the transmitters to be received are located. For this reason no decision can be made at present about the continuation of the project. It is suggested that a joint conference of representatives of HV Funk, Funkamt Berlitz and Funkwerk Köpenick decide whether the Fuss project is to be continued in its present form. An antenna amplifier is under development in T A. Tests have not yet been carried out in Berlitz. Such tests are to be deferred until a decision about the continuation of the project is reached. The trial installations were returned to our enterprise on 24 August 1955.